

**REMARKS — General**

By the above amendment, Applicants have amended the claims to define the invention more particularly and distinctly so as to overcome the technical rejections and define the invention patentably over the prior art.

**The Rejection Of The Claims Under § 112**

1. The last O.A. rejected claims 14, 29, and 31 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Applicants canceled the claims 14, 29, and 31 according to the last O.A.

**The Rejection Of The Claims Under § 102**

2. The last O.A. rejected claims 1-13, 15-28, and 30 under 35 U.S.C. 102(b) as being anticipated by Maurer, et al., US 6,272,231 B1 (hereinafter Maurer).

Applicants amended the claims as follows:

**The Rejection Of Claim 1 On Maurer Overcome**

3. Applicants respectfully request reconsideration of the rejection, as now applicable to the currently amended claim 1, for the following reasons:

Novel and unobvious approaches in applicants' system are clearly foreign to Maurer. The non-trivial differences clearly show the novelty and unobviousness of the present invention over the prior art. The differences in the fundamental approaches are discussed in the following at least three points.

(1) Determination of the race and gender of a person in the images is foreign to Maurer.

(2) Selection of a face model specific to the demographic recognition of the person as an approximate face model is foreign to Maurer.

(3) Combination of demographic recognition with affine coordinate based mesh adjustment technique face modeling is foreign to Maurer.

**Determination Of The Race And Gender Of A Person In The Images Is Foreign To Maurer**

4. Maurer teaches a data structure called a “bunch graph” in (Maurer, col. 5, lines 29-46).

However, Maurer is clearly foreign to the idea of determining the race and gender of a person in the images.

Maurer mentioned “race and gender” only to explain that the, “bunch graph covers a great variety of faces that may have significantly different local properties,” as explicitly noted in, “When constructed using a judiciously selected gallery, a bunch graph covers a great variety of faces that may have significantly different local properties, e.g., samples of male and female faces, and of persons of different ages or races.” (Maurer, col. 5, lines 42-46)

Whereas, applicants explicitly teach how to determine the race and gender of a person in the images, especially in consideration of three dimensional face modeling (applicants’ specification, page 8, line 11 – page 9, line 4).

**Selection Of A Face Model Specific To The Demographic Recognition Of The Person As An Approximate Face Model Is Foreign To Maurer**

5. Applicants discussed, “For a given set of face images of the person, the race and gender is determined, and a face model, specific for that sub-class (for example, male-Caucasian is a subclass) is chosen as an approximate face model by the subsystem 205 in the exemplary embodiment shown in FIG. 2.” in (applicants’ specification, page 9, lines 1-4 and page 5, lines 5-7).

Applicants also discussed, “This demographic classification is then used to select an approximate three dimensional face model from a set of models. Using this initial model and properties of camera projection, the model is adjusted leading to a more accurate face model.” in (applicants’ specification, abstract, lines 4-7)

Not only is Maurer entirely foreign to the idea of determining the race and gender of a person in the images, but also Maurer is entirely foreign to the idea of selecting a face model that is specific to the demographic recognition of the person as an approximate face model.

### **Combination Of Demographic Recognition With Affine Coordinate Based Mesh**

#### **Adjustment Technique Face Modeling Is Foreign To Maurer**

6. Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images, the idea of combining the demographic recognition with affine coordinate based mesh adjustment technique for the face modeling is further foreign to Maurer.

Maurer teaches the best-mapping selection process between, “the jet extracted from the image,” and, “all jets in the corresponding bunch attached to the bunch graph,” in (Maurer, col. 5, lines 38-42). However, Maurer is clearly foreign to the idea of utilizing the determined race and gender of a person in the images for the face modeling.

Maurer also teaches, “A tracking error also may be detected when certain geometrical constraints are violated (block 86),” (Maurer, col. 9, lines 7-8), where the, “constraints may be based on a flat plane model.” (Maurer, col. 9, lines 15-18). Maurer proposes, “this rough flat plane model assures that tracking errors may not grow beyond a predetermined threshold.” (Maurer, col. 9, lines 30-31).

This is clearly different from applicants’ idea of using a face model that is specific for a demographic class as an approximate face model. Applicants explicitly discussed this novel idea in, “For a given set of face images of the person, the race and gender is determined,” and then, “a face model, specific for that sub-class (for example, male-Caucasian is a subclass) is chosen as an approximate face model by the subsystem 205 in the exemplary embodiment shown in FIG. 2.” (applicants’ specification, page 9, lines 1-4). Maurer is entirely foreign to this approximation process.

7. Regarding claim 16, the last O.A. noted applicants to see rejection made to claim 1, as it addresses the rejection to the method of this apparatus.

Applicants amended claim 16, which recites limitations that are similar and in the same scope of the invention as those in claim 1 above.

Therefore, applicants respectfully request reconsideration of the amended claim 16 for the same reasons as stated above in regard to claim 1.

**The Dependent Claims Are a Fortiori Patentable Over Maurer**

8. Dependent claims 2 to 15 incorporate all the subject matter of claim 1 and add additional subject matter, which makes them a fortiori and independently patentable over the references.

Applicants amended the claims 2 to 15 as follows:

9. Regarding claim 2, claim 2 has been canceled.

10. Regarding claim 3, claim 3 further adds, “a step of displaying visual feedback about said face modeling.”

Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images, the limitation of displaying visual feedback about said face modeling after combining the demographic recognition with an affine coordinate based mesh adjustment technique for the face modeling in the dependent claim 3 is further foreign to Maurer.

11. Regarding claim 4, claim 4 has been canceled.

12. Regarding claim 5, claim 5 has been canceled.

13. Regarding claim 6, claim 6 further adds, “a step of using affine lines and their slope adjustment, which is proportional to depth of the point, for model estimation.”

Maurer teaches, “In addition to the frontal pose, bunch graphs need to be created only for rotations in depth.” with regard to the “tracking correction” in (Maurer, col. 9, lines 51-57).

Maurer is entirely foreign to the idea of using affine lines and their slope adjustment, which is proportional to depth of the point, for model estimation, in combination with the selected approximate face model based on the demographic determination (applicants' specification, page 9, lines 1-4, and page 5, lines 5-15).

14. Regarding claim 7, claim 7 further adds, "a step of using said affine line properties without the need for calibrating the image capturing systems, whereby the image capturing systems include cameras".

Maurer teaches, "Stereo-camera systems are able to perform accurate 3-D measurements when the cameras are fully calibrated (camera parameters are computed through a calibration process)" (Maurer, col. 11, lines 62-65) as a part of the techniques for obtaining the generic face model in (Maurer, col. 11, line 55 – col. 12, line 23). This is contradictory to one of the objectives that the applicants' present invention tries to overcome as discussed in (applicants' specification, page 3, lines 12-18, and page 4, lines 11-14). Maurer is foreign to this.

15. Regarding claim 8, claim 8 has been canceled.

16. Regarding claim 9, claim 9 further adds, "a step of using the affine line properties for re-projecting a matched pair in two images to a third image, once four facial landmarks are located in all of the three images".

Maurer teaches the "elastic bunch graph matching" using "a whole bunch of jets" in (Maurer, col. 5, lines 29-46). In order to form a bunch graph, "a collection of facial images (the

bunch graph gallery) is marked with node locations at defined positions of the head. These defined positions are called landmarks.” in (Maurer, col. 5, lines 34-37). Then, “When matching a bunch graph to an image, the jet extracted from the image is compared to all jets in the corresponding bunch attached to the bunch graph and the best-matching one is selected.” (Maurer, col. 5, lines 37-40).

Maurer defines the jets in “The jets are composed of wavelet transforms that are processed at node or landmark locations on an image corresponding to readily identifiable features.” (Maurer, col. 3, lines 3-5).

The “elastic bunch graph matching” and the usage of “landmarks” for the matching processing in (Maurer, col. 5, lines 29-46) is clearly different from the idea of re-projecting a matched pair in two images to a third image, once four facial landmarks are located in all three images using affine line properties, as discussed in “Once the facial landmarks are identified across the images, the depth of an arbitrary point in the face mesh is changed continually and reprojected to all views (following paraperspective camera projection properties). The depth value for which a successful match is obtained across views is chosen. This is repeated for a dense set of points on the face.” (applicants’ specification, page 5, lines 11-15). Therefore, Maurer is foreign to this.

17. Regarding claim 10, claim 10 further adds, “a step of using a single view to crudely model the face based on gender and ethnicity and then use anthropometric measures for identification”.

Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images as discussed above, Maurer is further foreign to this.

18. Regarding claim 11, claim 11 further adds, “a step of using multiple views to model the face in the image based on the combination of the demographics and the affine line properties and then use the anthropometric measures for identification purposes”.

Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images as discussed above, Maurer is further foreign to this.

19. Regarding claim 12, claim 12 further adds, “a step of using the combination of the demographics and the affine line properties for face modeling, followed by novel view generation of the face using rendering tools”.

Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images, and Maurer is further foreign to the idea of combining the demographics and affine line properties for face modeling, as discussed above, Maurer is even further foreign to this.

20. Regarding claim 13, claim 13 has been canceled.

21. Regarding claim 14, claim 14 has been canceled.

22. Regarding claim 15, claim 15 has been canceled.



23. Dependent claims 17 - 28 and 30 incorporate all the subject matter of claim 16 and add additional subject matter, which makes them a fortiori and independently patentable over the references.

Applicants amended the claims 17 - 28 and 30 as follows:

24. Regarding claim 17, claim 17 further adds, “a hardware system consisting of disparate cameras at disparate locations, images from which are used for said face modeling, whereby usages of the disparate cameras comprise multiple processing of the face modeling for multiple users”.

Since Maurer is entirely foreign to the idea of determining the race and gender of a person in the images as discussed above, Maurer is further foreign to the idea of using disparate cameras for determining the race and gender of a person in the images for the face modeling.

25. Regarding claim 18, claim 18 has been canceled.

26. Regarding claims 19, 20, 21, 23, 24, and 25, the last O.A. noted applicants to see rejection made to claims 3, 6, 7, 9, 10, and 11, respectively, as the claims 3, 6, 7, 9, 10, and 11 address the rejections to the methods of the apparatus in claims 19, 20, 21, 23, 24, and 25, respectively.

Applicants amended claims 19, 20, 21, 23, 24, and 25, which recite limitations that are similar and in the same scope of invention as to those in claims 3, 6, 7, 9, 10, and 11,

respectively, above. Therefore, applicants respectfully request reconsideration of the amended claims 19, 20, 21, 23, 24, and 25, for the same reasons as stated above in regards to claims 3, 6, 7, 9, 10, and 11, respectively.

27. Regarding claim 22, claim 22 has been canceled.

28. Regarding claim 26, applicants amended claim 26, which recites limitations that are similar and in the same scope of invention as to those in claim 12 above.

Therefore, applicants respectfully request reconsideration of the amended claim 26 for the same reasons as stated above in regards to claim 12.

29. Regarding claim 27, claim 27 has been canceled.

30. Regarding claim 28, claim 28 has been canceled.

31. Regarding claim 30, claim 30 has been canceled.

32. Accordingly applicants submit that the dependent claims are a fortiori patentable and should also be allowed.

## CONCLUSION

For all the above reasons, Applicants submit that the specification and claims are now in proper form, and that the claims all define patentably over the prior art. Therefore they submit that this application is in condition for allowance now, which action they respectfully solicit.

## Conditional Request for Constructive Assistance

Applicants have amended the specification and claims of this application so that they are proper, definite, and define novel structure, which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, Applicants **very respectfully request** the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition.

Very respectfully,



Rajeev Sharma



Kuntal Sengupta

-----Applicants Pro Se-----

403 South Allen Street, Suite 101

State College, PA 16801

Tel. (814) 867-8977; Fax (814) 867-8957

**Certificate of Mailing**

I hereby certify that this correspondence, and attachments, if any, will be deposited with the United States Postal Service by First Class Mail, postage prepaid, in an envelope addressed to "Box Non-Fee Amendments, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" on the date below.

Date: 05/21/2008 Inventor's Signature: 